

AIR WAR COLLEGE  
AIR UNIVERSITY

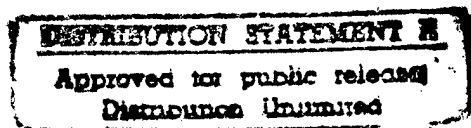
THE LUFTWAFFE AND ITS WAR OF ATTRITION

BY

Patricia L. C. Priest  
Lieutenant Colonel, USAF

A RESEARCH REPORT SUBMITTED TO THE FACULTY  
IN  
FULFILLMENT OF THE CURRICULUM  
REQUIREMENT

Advisor: Dr. Daniel J. Hughes



MAXWELL AIR FORCE BASE, ALABAMA

April 1995

DTIC QUALITY INSPECTED 3

19970909 153

New Text Document.txt

03 Sept 97

This paper was downloaded from the Internet.

Distribution Statement A: Approved for public release;  
distribution is unlimited.

POC: AIR WAR COLLEGE.  
MAXWELL AFB, AL.



## DISCLAIMER

This study represents the views of the author and does not necessarily reflect the official opinion of the Air War College or the Department of the Air Force. In accordance with Air Force Regulation 110-8, it is not copyrighted, but is the property of the United States government.

Loan copies of this document may be obtained through the interlibrary loan desk of Air University Library, Maxwell Air Force Base, Alabama 36112-5564 [telephone (334) 953-7223 or DSN 493-7223].

## ABSTRACT

TITLE: The Luftwaffe and Its War of Attrition

AUTHOR: Patricia L. C. Priest, Lieutenant Colonel, USAF

Over the years, the United States Air Force takes much credit for bringing World War II to closure. The strategic bomber, eventually along with long range fighter, was put in the skies over Germany to gain air superiority and to disrupt the war making abilities of Germany and, in particular, the Luftwaffe. The Luftwaffe had to be neutralized before the invasion of Normandy could take place. Granted this was a necessary step. However, the Luftwaffe had already lost its fighting ability and the war through poor strategy and judgment long before the strategic bomber and the long range fighter could become factors in the war.

## BIOGRAPHICAL SKETCH

Lieutenant Colonel Patricia L. C. Priest (Master of Science, Systems Management, University of Southern California) has been interested in the air campaign of World War II for some time. Her father, Royce W. Priest, Colonel, USAF (Retired), was a World War II fighter ace, flying P-51s from England over France and Germany. Colonel Priest's background is administration. She has held a variety of positions, to include executive officer at a major command, director of administration at a joint command, and commander of a military entrance processing station. She is a graduate of the Air Command and Staff College, where she was a Distinguished Graduate. Colonel Priest is a graduate of the Air War College, class of 1995.

## TABLE OF CONTENTS

DISCLAIMER.....	ii
EXECUTIVE SUMMARY .....	iii
BIOGRAPHICAL SKETCH .....	iv
Chapter	
I. INTRODUCTION .....	1
II. HITLER'S OBJECTIVE, STRATEGY, AND DOCTRINE.....	3
III. THE LUFTWAFFE'S ROAD TO ATTRITION .....	7
Aircraft Development .....	9
Aircraft Losses .....	14
Pilot Losses .....	20
IV. SUMMARY .....	25
V. CONCLUSION.....	26
BIBLIOGRAPHY .....	27

## CHAPTER I

### INTRODUCTION

"Allied air power was decisive in the war in Western Europe. . . . In the air, its victory was complete."<sup>1</sup> Throughout my military career, I had always been under the impression that strategic bombing during World War II was the critical factor in winning the war and that air superiority was won over the skies of Europe because of America's superior aircraft and better trained airmen. I had always given credit to those great American pilots for winning the air war over Germany. Recently, however, I have altered my thinking. I will concede that the strategic bombing campaign's objective of obtaining air superiority over Germany was finally achieved during the period between December 1943 and the invasion of Normandy with the arrival of the P-51 long-range fighter. Had it not been for gaining air superiority over Germany, the invasion of Normandy would have been a failure, if not impossible.

So, why has my thinking changed? With German aircraft production at its peak in 1943 and 1944, I now ask myself where were the bombers and fighters and why were they of no consequence during the invasion?<sup>2</sup> The answer I discovered was that even with a mass number of aircraft available, if in fact production numbers were not inflated by the Germans, the war for the German Luftwaffe had essentially been lost before the advent of the American long range fighter into the war and before it ever became a factor in winning the air war for the Allies. Simply stated, the Germans lost in a war of attrition, the same war of attrition General Eaker had envisioned the strategic bomber force would win.<sup>3</sup> This war of attrition, however, started long before America's entry into the war in 1941. By the time the long-range fighter arrived in theater, it had

---

<sup>1</sup>United States Strategic Bombing Surveys. Report No. 1, *Summary Report (European War)*, September 30, 1945 (Reprinted by Air University Press, Maxwell AFB, AL, October 1987), p. 37.

<sup>2</sup>*Ibid.*, p. 19.

<sup>3</sup>McFarland, Stephen L., and Newton, Wesley Phillips, *To Command the Sky* (Washington: Smithsonian Institution Press, 1983), p. 93.

basically been lost by the Germans, not won by the Western Allies. There were several factors that led Hauptmann Hermann to write in 1943, "The Luftwaffe is doomed."<sup>4</sup> The decisions to curtail production of aircraft early on and not develop advanced aircraft to conduct critical missions throughout the war; the significant loss of aircraft while fighting a three-front war; and the critical loss of experienced pilots, to include the lack of pilot training, were all key to the demise of the Luftwaffe. Before discussing each of these points individually, it's important to understand Hitler's basic objective, strategy, and doctrine as he led his country to war.

---

<sup>4</sup>Hermann, Hauptmann, *The Luftwaffe: Its Rise and Fall* (New York: G. P. Putnam's Sons, 1943), p. 278.

## CHAPTER II

### HITLER'S OBJECTIVE, STRATEGY, AND DOCTRINE

The period between World I and World War II for the Germans was a time to rebuild their country. When Hitler came to power in 1933, he intended to build a strong army, capable of conquering Europe.<sup>5</sup> His philosophy was simple. He believed in a racial struggle, one that would annihilate the "inferior Slavonic peoples of eastern Europe." As such, his objective was to secure "living space" (*Lebensraum*) and along with it "the resources necessary for the survival of 'the thousand-year *Reich*'."<sup>6</sup> To accomplish his objective, he had to go to war against the powers of Europe. Hitler's strategy was to go on the offensive and quickly defeat the armies of his enemies in a fast move across Europe. As part of the strategy to meet his objective, he needed an air force capable of supporting the army in its march against the countries of Europe. Although a separate service, at the outset many argue it became essentially a tactical air force with a doctrine of concentration supporting the army's *Blitzkrieg*-style operations.<sup>7</sup> The "lightening" defeat of Poland substantiated this doctrine from the beginning and this theory took hold.<sup>8</sup> Although the quick, decisive victory of the army was due in large measure to the combined arms effort of the army and the air force, there is evidence to show this was not Hitler's original intent for his air force.

Hitler realized the great potential of airpower. As the new leader of Germany, he understood that not only were an army and navy required but an air force was necessary to maintain a strong Germany. He recognized air power's uses as a force

---

<sup>5</sup>United States Strategic Bombing Surveys, p. 6.

<sup>6</sup>Willmott, H. P., *The Great Crusade* (New York: The Free Press, A Division of Macmillan, Inc., 1989), p. 13.

<sup>7</sup>Great Britain, Air Ministry, *The Rise and Fall of the German Air Force, 1933-1945* (Great Britain: Arms and Armour Press Ltd., 1983), p. 53, and McFarland and Newton, *To Command the Sky*, p. 39. Also, for a list of other resources espousing this commonly held view, see Murray, Williamson, *German Military Effectiveness* (Baltimore, Maryland, The Nautical and Aviation Publishing Company of America, 1992), Note 1, p. 49.

<sup>8</sup>Great Britain, Air Ministry, *The Rise and Fall of the German Air Force, 1933-1945*, p. 53.

enhancer protecting the army on the front lines, as a defender of the homeland and its industries, and as an offensive weapon to paralyze the enemy's war making capability.<sup>9</sup> Airpower would work in conjunction with the other services as an offensive, strategic, weapon. The Luftwaffe's priorities were first to gain air superiority through attacks on bases and air-to-air campaigns, attack the war making capabilities of the enemy's homeland, interdict the enemy's lines of communication and logistics, then support the ground war through close air support should a stalemate occur. The Luftwaffe was not designed to be the sole element in success of a war. It was designed to be an independent arm in support of the entire war effort, allowing the army freedom of action on the battlefield.<sup>10</sup>

Despite the contradiction with regard to the strategy of employing air power, teachings before the war by General Walther Wever, the Luftwaffe's first chief of staff, were important in the Luftwaffe understanding the many roles it would play. The emphasis was on developing an overarching air campaign supporting all services to achieve a strategic objective, which depended on the goals of the national strategy.<sup>11</sup> Aircraft development problems, however, led the Luftwaffe to place more emphasis on the more tactically oriented, roles of air power, such as reconnaissance, interdiction, and close air support.<sup>12</sup> Airmen of the Luftwaffe, though, believed that the deciding factor in the coming war would be strategic bombing. Notwithstanding, Germany faced a land battle from the start. Realistically, long-range strategic bombing against certain targets was not feasible if Germany did not win the war on the ground to capture much-needed resources. As such, the Luftwaffe was capable of being a flexible force thanks

---

<sup>9</sup>Cooper, Matthew, *The German Air Force, 1933-1945* (New York, Jane's Publishing Incorporated, 1981), pp. 12-13.

<sup>10</sup>Cooper, *The German Air Force, 1933-1945*, pp. 40-43, and Murray, *German Military Effectiveness*, p. 70.

<sup>11</sup>Murray, *German Military Effectiveness*, pp. 42-43 and 102.

<sup>12</sup>*Ibid.*, p. 57.

to Weber's early teachings.<sup>13</sup> This flexible, yet strategic, policy then determined the type of aircraft required. The concern with material resources in case of a long war determined the Stuka (or medium bomber) would have priority ". . . for close and medium support and to attack targets far behind the front line; fighters, as primarily defensive machines, were to take a secondary role."<sup>14</sup> This decision would have key consequences for the Luftwaffe and its ability to fight the long-range strategic war they did not foresee.

After a resounding success in Poland, this flexible "*Blitzkrieg*-style" doctrine was to again prove successful with the invasions of Norway, Denmark, France, Holland, and Belgium. A statement issued by Field Marshal Kesselring on the subject of Luftwaffe policy reveals the thinking of the time:

. . . [M]any dispassionate critics were firmly convinced that the rapid successes of German arms were only achieved thanks to the direct and indirect deployment of the whole Luftwaffe in support of the ground troops. Only where the Luftwaffe had prepared the way did the Army advance. For this purpose our main requirement was a close-support force. . . .<sup>15</sup>

Hitler and Goering were convinced that air power's role in the *Blitzkrieg* was of primary importance.

The campaigns had proved that an air force with superiority and in possession of the initiative could give powerful and decisive support to rapid armoured thrusts by preparing the way with concentrated bombing, and by sealing the flanks of the armoured forces to enemy interference. The effectiveness of the airborne operation, also with the prerequisite of air superiority, had also been proved.<sup>16</sup>

It had all been too easy. In Hitler's and Goering's minds they had the winning solution--the war had been won. As such, they did not foresee the necessity to improve the

---

<sup>13</sup>Ibid., p. 48.

<sup>14</sup>Cooper, *The German Air Force, 1933-1945*, p. 45.

<sup>15</sup>Bekker, Cajus, *The Luftwaffe War Diaries*, Trans. and ed. by Frank Ziegler (London: MacDonald & Co. Ltd., 1966), pp. 375.

<sup>16</sup>Great Britain, Air Ministry, *The Rise and Fall of the German Air Force, 1933-1945*, p. 73.

Luftwaffe's equipment and training.<sup>17</sup> After all, it had paved the way for the army to overrun several countries within a matter of months.

With these victories, the role of the Luftwaffe was now deeply entrenched in the minds of its leadership; its use was to be one of a strategic air arm, assuming many tactical roles, with the medium dive bomber the primary aircraft of choice. The superiority of aircraft and airmen was evident; the Luftwaffe had not been seriously opposed. There were no other air forces in Europe that could compare to the invulnerable Luftwaffe. This was the war that could and would be fought and won through air power's role with the *Blitzkrieg*. Logically, there was no need to adopt a new doctrine or strategy when the successes of the armed forces were overwhelming.

With the speedy victories over Poland, Norway, and France, it was no wonder the German High Command came to believe the war would soon come to an end. The doctrine of *Blitzkrieg*, the role of airpower, with little thought given to its "long-range" strategic use, and an offensive strategy based on a short and limited war led to major higher headquarters decisions made early on that were to have a major effect on the war's outcome. These decisions would handicap the Luftwaffe and start the war of attrition the German air arm was to lose.

---

<sup>17</sup>Ibid., p. 72-73.

### CHAPTER III

#### THE LUFTWAFFE'S ROAD TO ATTRITION

##### Aircraft Production

One of these decisions was to cut production. Evidence of the short war mentality, ". . . there was no effective long-term planning of investment, procurement, manpower resources and research and development programmes that linked industrial output with military requirements. . . ." <sup>18</sup> In the years between 1936 and 1939, aircraft production had been reduced significantly due to the lack of qualified workers and the retooling required for updating aircraft in armaments and engines already obsolete at the beginning of the war. By autumn of 1939, aircraft production had improved to 700 per month; however, it only increased to about 800 per month for the entire first year of the war. For the first two years of the war, production remained essentially at prewar levels. <sup>19</sup>

During 1940 and 1941, German arms production had been lower than Britain's. <sup>20</sup> As an example, during the Battle of Britain, German aircraft companies were being out produced by the British 2.1 to 1. <sup>21</sup> In fact, "Luftwaffe forces available for the invasion [of Russia] indicate not just a leveling off of German combat power but an actual decrease from the levels attained for the offensive against France." <sup>22</sup> For example, in long-range bombers the Luftwaffe possessed 1,300 for the invasion of France and only 775 at the beginning of hostilities against Russia; in twin-engine fighters the Luftwaffe possessed 350 for France and 90 for Russia. By May 1941, the Luftwaffe had 200 less bombers than it did one year earlier. <sup>23</sup> Despite the overall level of losses for this one year alone, the initial successes in Russia made Hitler so confident in victory that ". . .

---

<sup>18</sup>Willmott, *The Great Crusade*, p. 217.

<sup>19</sup>Great Britain, Air Ministry, *The Rise and Fall of the German Air Force, 1933-1945*, pp. 27 and 205.

<sup>20</sup>United States Strategic Bombing Surveys, p. 7.

<sup>21</sup>Willmott, *The Great Crusade*, p. 108.

<sup>22</sup>Murray, *German Military Effectiveness*, p. 123.

<sup>23</sup>Ibid.

he ordered large scale cut-backs in war production" in September 1941.<sup>24</sup> By December 1941, as with Britain, the Luftwaffe was now being out produced by the Russians 3 to 1.<sup>25</sup>

<b>German Aircraft Production</b>						
	<i>1940</i>	<i>1941</i>	<i>1942</i>	<i>1943</i>	<i>1944</i>	<i>1945</i>
<i>Bombers</i>	2,852	3,373	4,337	4,649	2,287	-----
<i>Fighters</i>	2,746	3,744	5,515	10,898	25,285	4,935
<i>Grnd-attk</i>	603	507	1,249	3,266	5,496	1,104
<i>Training</i>	1,870	1,121	1,078	2,274	3,693	318
<i>Others</i>	<u>2,176</u>	<u>3,656</u>	<u>3,230</u>	<u>3,720</u>	<u>3,832</u>	<u>1,182</u>
<i>TOTAL</i>	10,247	12,401	15,409	24,807	40,593	7,539

**Figure 1<sup>26</sup>**

It was not until after the Battle of Britain and significant losses started to occur on the Eastern Front that the German "High Command was goaded into operating a plan for substantially increased aircraft production."<sup>27</sup> Hitler ordered production increased in 1942, but it was to take time to start producing the numbers needed (see figure 1). Ignoring attrition rates between July 1940 and December 1941, failing to keep production going in the early years, and failing to anticipate future needs by gloating over past victories were to eventually cost the Luftwaffe the air war in 1943 and 1944.<sup>28</sup> One might assume in figure 1 that the significant increase in the output of aircraft before the war's end would have been the solution to the problem of attrition. The aircraft produced, however, were the old Me 109, Fw 190, Bf 109 and 110, Ju 87 and 88, and He 111 aircraft with which the Luftwaffe had started the war and which by

<sup>24</sup>United States Strategic Bombing Surveys, p. 7.

<sup>25</sup>Willmott, *The Great Crusade*, p. 218.

<sup>26</sup>Bekker, *The Luftwaffe War Diaries*, p. 377.

<sup>27</sup>Great Britain, Air Ministry, *The Rise and Fall of the German Air Force, 1933-1945*, p. 28.

<sup>28</sup>McFarland and Newton, *To Command the Sky*, p. 97, and Murray, Williamson, *Strategy for Defeat, the Luftwaffe, 1933-1945* (Maxwell AFB, AL: Air University Press, 1983), pp. 88 and 302.

now were not as technically superior to aircraft being produced by the Allies.<sup>29</sup> To compound the initial low production problem, decisions made on aircraft development were to have a major impact on the Luftwaffe that would come back to haunt it.

### Aircraft Development

Several early aircraft development decisions had a serious impact on how the Luftwaffe was able to prosecute the war. One of the most critical was the German preoccupation with the dive bomber. Germans had been fascinated with dive bombing since World War I, where the Schlachtstaffeln supported troops on the front line. In the inter war period, General Ernst Udet, Director of Supplies and head of the Technical and Planning Board, became impressed with the dive bomber, as well, and persuaded Goering to start producing the popular Stuka (Ju 87) dive bombers in support of ground forces in an indirect role.<sup>30</sup> Goering looked for an opportunity to technically test his young Luftwaffe, and Germany's intervention in Spain's civil war in 1936 afforded him this opportunity. Successes in Spain confirmed the Luftwaffe was on the right track concerning strategy and tactics. "It was proved that bombers were extremely effective when used against enemy troop concentrations, strong-points, and lines of communication."<sup>31</sup> The precision dive attack had proved very successful in Spain with the accuracy of the Ju 87 dive bomber. Based on this experience and the fact that accuracy was important in avoiding wastage in an already low producing munitions industry, "Udet concluded that every bomber should be a dive bomber."<sup>32</sup>

In August 1939, Goering and his staff decided to restrict development and production of new aircraft in order to concentrate on developing dive-capable aircraft.<sup>33</sup>

---

<sup>29</sup>Baumbach, Werner, *The Life and Death of the Luftwaffe*, Trans. by Frederick Holt (New York: Ballantine Books, 1949), p. 188, and Price, Alfred, *Luftwaffe: Birth, life and death of an air force* (New York, NY: Ballantine Books Inc., 1969), p. 94.

<sup>30</sup>Cooper, *The German Air Force, 1933-1945*, pp. 48-49 and Murray, *Strategy for Defeat, the Luftwaffe, 1933-1945*, p. 13.

<sup>31</sup>Cooper, p. 60.

<sup>32</sup>Murray, *Strategy for Defeat, the Luftwaffe, 1933-1945*, p. 13.

<sup>33</sup>*Ibid.*, p. 20.

With the success of the Ju 87 in Spain, the idea of developing a long-range dive bomber in the Ju 88 (whose speed had already been proven) became very popular. Problems, however, were soon discovered during production because various design changes resulted in making the plane heavier (an attribute that made it difficult to handle while dive bombing) in order to carry more armament and fly longer distances.<sup>34</sup> To complicate matters, Goering insisted production be stepped up before all prototype testing had been completed. This forced development, combined with poor performance and design of the dive-bombing capability, in essence caused a year's delay in final production, "resulting in severe dislocation to the Luftwaffe's entire procurement programme."<sup>35</sup>

Following Udet's early lead, Colonel-General Hans Jeschonnek, Chief of the Luftwaffe General Staff, had insisted that all future bombers must be able to dive-bomb. Jeschonnek's decision to produce only bombers that were dive bomber capable caused a more significant production problem for airplanes already in development. Half way through construction in 1939, third generation bombers (Do 217 and He 177, a four-engine bomber) in the flight test stage were now being strengthened for diving attacks. It was not long before the Germans realized these planes were unsuitable for this new purpose. Engine cooling systems would burst into flames, which led to severe delays in getting the planes into action. The need to be dive bomber capable also caused the complete failure of the Me 210. In addition to dive bombing, it had to fill requirements as a heavy bomber and a fighter bomber, none of which could be accomplished satisfactorily. Not realized by the leadership in 1939, this factor became evident in

---

<sup>34</sup>Murray, *Strategy for Defeat, the Luftwaffe, 1933-1945*, pp. 13-14, and Price, *Luftwaffe: Birth, life and death of an air force*, p. 36.

<sup>35</sup>Cooper, *The German Air Force, 1933-1945*, p. 51.

1941 and 1942 when these planes were needed to replace existing aircraft, but no one thought the war would last that long.<sup>36</sup>

Udet broadened his thinking in 1940 as British bombers made raids over Germany. Foreseeing the advent of American bombers, he became an advocate for more fighters. His concerns, however, fell upon deaf ears. Jeschonnek was not interested in fighters or long-range bombers. He wanted to develop a "wonder-bomber" that would be a dive bomber, night fighter, and long-range bomber "all rolled into one." This, however, became an impossible thing to do for the same reasons other aircraft had failed trying to fulfill the needs of multi roles.<sup>37</sup> Even by 1943, when Udet's prediction concerning the destructiveness of British and American bombers over Germany had long since come true, Jeschonnek still had not acted to create a fighter force powerful enough to defend the skies over Germany.<sup>38</sup> The medium bomber was still the choice among the German leadership, as will be shown later.

Another production decision detrimental to the air war became apparent to the senior leadership during the Battle of Britain, where the Luftwaffe was used for the first time in a "long-range" strategic role. As stated earlier, the Luftwaffe served as a "strategic" weapon in support of the army in a Central European campaign and was equipped as such. It did not possess the required long-range, heavy four-engine bomber, nor a long-range fighter. Again, this was a conscious decision Udet had made early in the Luftwaffe's development and production cycle. He believed a bomber needed speed and evasion in order to penetrate enemy defenses, and the heavy, four-engine bomber was merely a slow-moving target for the enemy. He, therefore, ordered only the medium twin-engine bomber be built.<sup>39</sup> Udet's initial decision to produce a

---

<sup>36</sup>Cooper, *The German Air Force, 1933-1945*, pp.70-71, and Price, *Luftwaffe: Birth, life and death of an air force*, pp. 36-37.

<sup>37</sup>Bartz, Karl, *Swastika in the Air* (London: William Kimber and Co. Limited, 1956), pp. 77-78.

<sup>38</sup>Ibid., p. 77.

<sup>39</sup>Lee, *The German Air Force* (New York: Harper & Brothers Publishers, 1946), p. 5.

medium bomber, along with Jeschonnek's subsequent decision to require all bombers to be dive bombers, resulted in the Luftwaffe's failure in the Battle of Britain and on the Eastern front to strike deep into Russia.<sup>40</sup>

It is unrealistic to expect the Germans to have had a long-range strategic air force when the United States didn't even possess one until 1943. The quick victories of the Luftwaffe in support of the army justified the technological efforts at the time.<sup>41</sup> Nonetheless, successive losses in the Battle of Britain and over the Eastern Front, as well as continued raids into the homeland, finally made Jeschonnek realize his decision had been ill-suited for the future needs of his country.<sup>42</sup> When the German Air Staff realized the importance of the heavy, four-engine bomber for the strategy that was now required to prosecute the war, it was unable to devote the resources or the manpower in sufficient numbers to have any effect on the outcome of the war. "After 1941 Germany never had the air resources which the Allies were able to develop."<sup>43</sup> There was, however, another critical technological decision made during the course of the war where the dogma of doctrine and strategy played an important role.

In addition to the above mentioned detrimental production decisions, Hitler decided in 1940 to stop all research and development on aircraft that could not be introduced within two years. Despite this order, a fighter aircraft was introduced in 1943 that could have made the difference to the Luftwaffe in the fight for control of the skies.<sup>44</sup> In the first years of the war, fighters were not given the high development priority within the Luftwaffe that bombers held. Nonetheless, fighters did have two missions to perform: protection of the bomber from enemy interception and defense of

---

<sup>40</sup>Bekker, *The Luftwaffe War Diaries*, pp. 182 and 300, and Price, *Luftwaffe: Birth, life and death of an air force*, p. 65.

<sup>41</sup>Bekker, pp. 374-375.

<sup>42</sup>Bartz, *Swastika in the Air*, p. 156.

<sup>43</sup>Lee, *The German Air Force*, p. 279.

<sup>44</sup>Galland, Adolf, "Defeat of the Luftwaffe: Fundamental Causes," *Air University Quarterly Review* (Spring 1953, No. 6), pp.26 and 30.

the homeland (of lesser importance). Fighter choices "posed fewer problems than did that of the bombers, but the consequences of a wrong decision were to be just as harmful to the Luftwaffe's prospects in war, if not more so."<sup>45</sup> Hitler's decision to convert the Me 262, a high performance jet fighter much needed in the air war that would be fought on the Western Front, to a high-speed, fighter bomber would have a devastating effect on the outcome of the war. By mid-1943, the plane had been fully tested and was ready for production. It was Germany's answer to America's long-range fighter that was soon to be introduced into the theater. Hitler, however, did not foresee the crucial need to defend Germany against the threat of a newly developed long-range fighter the Americans were building. His main concern was to thwart the invasion from England he knew was coming by supporting ground troops from the air. Hitler decided to convert the Me 262 to a high-speed bomber, which required extensive modifications to adapt it to its new role, which, in turn, delayed production too late to prevent the Allies from gaining air superiority over Europe or from invading Normandy.<sup>46</sup>

These unrealistic design modifications resulted in numerous failures of next generation aircraft coming off the assembly line. Also, the lack of a coherent plan for new aircraft development resulted in a ban on new designs in order to get aircraft in the air to fight the ongoing war. With the problem of shortages in raw materials and increasing demands on the Eastern Front, the German High Command had no choice but to continue producing the front-line aircraft it had used during the early years of the war: He 111 and Ju 88 bombers, Ju 87 dive bombers, and the Me 109 and Me 110 fighters.<sup>47</sup> "They would fight the great air battles of 1943 and 1944 with basically the same equipment that they had used against Poland."<sup>48</sup> Unfortunately, these planes,

---

<sup>45</sup>Cooper, *The German Air Force, 1933-1945*, p. 52.

<sup>46</sup>McFarland and Newton, *To Command the Sky*, p. 236; Price, *Luftwaffe: Birth, life and death of an air force*, p. 128; and Baumbach, Werner, *Broken Swastika: The Defeat of the Luftwaffe*, Trans. by Frederick Holt (London: Robert Hale Limited, 1960), pp. 65-66.

<sup>47</sup>Baumbach, *Broken Swastika: The Defeat of the Luftwaffe*, pp. 42-44.

<sup>48</sup>Murray, *Strategy for Defeat, the Luftwaffe, 1933-1945*, p. 20.

though some modifications were made, were eventually to prove to be no match for the technically advanced American aircraft coming into the theater. The lack of appropriate aircraft production and development decisions to offset the strategy and tactics being waged by the enemy were the foundations for the war of attrition the Luftwaffe would lose. The high loss of aircraft was obviously another factor of attrition.

### Aircraft Losses

The Luftwaffe's high loss of aircraft was evident at the outset. In Poland, the Luftwaffe lost 285 aircraft in a campaign that was only four weeks long.<sup>49</sup> In a matter of three weeks during May 1940 over Scandinavia and Western Europe, the Germans lost 20.2 percent of their total force structure.<sup>50</sup> Luftwaffe aircraft losses from all causes between May and September 1940 was 57 percent of its initial strength.<sup>51</sup> "By the time the United States entered the war in December 1941, the Germans had lost the equivalent of two whole air forces."<sup>52</sup> The following figures show the effects of attrition over a period of two years: in March 1940, the Luftwaffe had 3,692 combat aircraft; 3,451 in June 1941; and 2,872 in spring 1942. By the summer of 1942, the Luftwaffe was no stronger than it had been a year earlier.<sup>53</sup> This trend was made that much more serious with Hitler's insistence on fighting a three-front war: the Western Front, the Eastern Front, and the Mediterranean.

The Battle of Britain was the first of three major defeats the Luftwaffe endured before the end of 1940. In the short period between 10 July and 31 October 1940, after starting with 2,600 aircraft in July 1940, the Luftwaffe lost 1,733 aircraft, compared to 915 by the Royal Air Force (RAF), a ratio of nearly two to one.<sup>54</sup> Although there were

---

<sup>49</sup>Bekker, *The Luftwaffe War Diaries*, p. 59.

<sup>50</sup>Murray, Williamson, "Attrition and the Luftwaffe," *Air University Review* (March-April, 1983, Vol. XXXIV, No. 3), p. 67.

<sup>51</sup>Murray, *German Military Effectiveness*, p. 181.

<sup>52</sup>Murray, Williamson, "Attrition and the Luftwaffe," p. 67.

<sup>53</sup>Willmott, *The Great Crusade*, p. 218.

<sup>54</sup>Cooper, *The German Air Force, 1933-1945*, p. 162, and Price, *Luftwaffe: Birth, life and death of an air force*, pp. 53 and 61.

sufficient bombers and fighters in the Luftwaffe to continue the fight, the development decisions that corresponded with the strategy of supporting the army on the ground in a Central European campaign and the early production decisions were significant factors affecting attrition in the Battle of Britain. The Luftwaffe was deficient in a long-range bomber capable of carrying heavy bomb loads and a long-range fighter capable of sustainment in the intercept role.<sup>55</sup> From 8 August to 6 September 1940, losses of Bf 109s (from all sources) amounted to one and one half times the number of planes produced. A fact that concerned the Germans.<sup>56</sup> Prolonged attacks on Britain continued to take their toll on reducing the size of the Luftwaffe. For example, in the first nine months of 1942, one Luftwaffe unit lost aircraft and crews equal to its original number every succeeding three months.<sup>57</sup> From July to September 1943, the overall strength of the Luftwaffe had decreased by 1,000 aircraft, while the Allied air forces were being strengthened with American bombers and the incoming long-range fighter.<sup>58</sup> These figures, however, were to be overshadowed by the heavy losses incurred in the Battle of Moscow during the autumn of 1941.<sup>59</sup>

Still smarting from the significant losses in the Battle of Britain, Goering, in one of the few times he tried to dissuade Hitler, pleaded with him not to start the war on the Eastern Front against Russia: "The Luftwaffe is the only branch of the Wehrmacht which has not had a breathing spell since the war began. Before the outbreak of the war I told you that I was going into battle with my training groups, and now these are practically all gone."<sup>60</sup> The Luftwaffe had put two-thirds of its combat strength or 2,475 aircraft on the Eastern Front, its largest undertaking by far, by 21 June 1941. As mentioned earlier, this was no larger than the strength sent against France in May 1940.

---

<sup>55</sup>Cooper, *The German Air Force, 1933-1945*, p. 161.

<sup>56</sup>*Ibid.*, p. 148.

<sup>57</sup>Price, *Luftwaffe: Birth, life and death of an air force*, p. 94.

<sup>58</sup>Willmott, *The Great Crusade*, p. 303.

<sup>59</sup>*Ibid.*, p. 111.

<sup>60</sup>Cooper, *The German Air Force, 1933-1945*, p. 219.

By 5 July 1941, scarcely two weeks later, this number had already decreased to 1,888.<sup>61</sup> After three months, 1,603 German aircraft had been shot down, with 1,028 damaged.<sup>62</sup> From 22 June 1941 to 8 April 1942, the Luftwaffe had lost 2,951 aircraft, with another 1,997 damaged. Losses in the summer and autumn of 1941 amounted to over one third of German production during the entire period.<sup>63</sup> By spring 1943, the Soviets had 5,500 aircraft flying against 2,260 the Luftwaffe could bring to bear.<sup>64</sup> As it had in the Battle of Britain, the Luftwaffe once again felt the absence of the much needed heavy, four-engine bomber. Fighter units were deployed to the front, lacking the ability to hit strategic targets deep into Russian territory because of their short range. Even medium-bomber units were placed on the front, rather than being used to destroy the factories that produced planes and other armaments that would soon overrun Germany.<sup>65</sup> No matter how many planes the Luftwaffe shot down or destroyed on the ground, the Russians continued to mass produce them, and they had the pilots to fly them, as well. The shortage of aircraft prevented the Luftwaffe from gaining air superiority in all sectors over Russia, thus preventing it from concentrating its efforts on support of the ground troops. Russian aircraft were able to annoy the German troops, which led to constant calls for airpower, stretching the Luftwaffe that much thinner. Eventually, all ground operations were planned assuming the presence of airpower.<sup>66</sup> During the first four months of the Russian campaign, 20.5 percent of the dive bombers were either lost or damaged per month. "Overall, the Russian campaign drastically increased the attrition of the force structure (a factor that would not end until May 1945)."<sup>67</sup> Again, the Luftwaffe's successes were many, but the Luftwaffe was fighting a

---

<sup>61</sup>Muller, Richard, *The German Air War in Russia* (Baltimore, Maryland: The Nautical & Aviation Publishing Company of America, 1992), pp. 38-39.

<sup>62</sup>Price, *Luftwaffe: Birth, life and death of an air force*, p. 79.

<sup>63</sup>Bekker, *The Luftwaffe War Diaries*, p. 377.

<sup>64</sup>Willmott, *The Great Crusade*, p. 302.

<sup>65</sup>Bekker, *The Luftwaffe War Diaries*, pp. 232 and 300.

<sup>66</sup>Cooper, *The German Air Force, 1933, 1945*, pp. 224-225.

<sup>67</sup>Murray, *German Military Effectiveness*, p. 129.

losing battle against a formidable opponent able to replace its armament quickly. The Luftwaffe's overpowering numerical losses in Russia, therefore, resulted in its second defeat in the air.

Another major factor affected attrition on the Eastern Front. The Luftwaffe was forced, because of the shortage of planes, to deploy all types of bombers to the ground support role. It was difficult to replace these more expensive planes, and as a result, replacements were not keeping pace with losses in either fighters or bombers.<sup>68</sup> ". . . [T]he demands of the war of attrition on the Eastern Front had reduced the German strategic bomber force to comparative impotence."<sup>69</sup> The heavy losses from the Battle of Britain and the Eastern front, along with the inept leadership in bringing production up to the necessary levels, also forced the Luftwaffe to use its reserves.<sup>70</sup> In addition, during the spring and summer of 1942, every plane that could be mustered was used to support ground troops with air drops. Airlift operations to Demyansk and Kholm to support 3,500 ground troops was one such example in which the Luftwaffe lost 300 aircraft. Hitler refused to allow his ground troops to retreat and sacrificed the Luftwaffe in order to hold the line; by this, he had established a dangerous precedent.<sup>71</sup> The results of the shortages created by these operations would be felt not only in the area of aircraft losses but in the area of training, as will be shown later.<sup>72</sup> The winter of 1942-1943 was devastating for the Luftwaffe. Its aircraft strength had been reduced to 1,700, of which only 40 percent were operational. The Russian air force, on the other hand, had 5,000 front-line aircraft, making it impossible for the Luftwaffe to secure air superiority and support ground forces.<sup>73</sup> The Western Front had already been "robbed"

---

<sup>68</sup>Bekker, *The Luftwaffe War Diaries*, p. 232; Muller, *The German Air War in Russia*, p. 62; and Price, *Luftwaffe: Birth, life and death of an air force*, p. 79.

<sup>69</sup>Price, p. 118.

<sup>70</sup>*Ibid.*, p. 80.

<sup>71</sup>*Ibid.*, p. 81.

<sup>72</sup>*Ibid.*, p. 87.

<sup>73</sup>Cooper, *The German Air Force, 1933-1945*, pp. 256-257.

to support the air effort on the Eastern Front. Now the Eastern Front would suffer as the air arm stretched out even farther with Hitler's decision to support the Italians in the Mediterranean, thus creating a third front.

The Luftwaffe had actually started operations in the Mediterranean as early as June 1940 to assist the Italians against British shipping.<sup>74</sup> However, campaigns in the Mediterranean and North Africa, starting in July 1941, resulted in the Luftwaffe's third major defeat. Once again, the lack of a long-range bomber severely handicapped any strategy the Germans may have had concerning the Mediterranean theater. The Germans needed to prevent the Americans from landing in North Africa, and the absence of a long-range bomber in sufficient numbers limited the Luftwaffe's ability to destroy American convoys at sea.<sup>75</sup> Also, "[t]he Luftwaffe did not have enough aircraft any more to wage a full-dress battle in Africa."<sup>76</sup> Although there were successes and air support was vital, particularly air transport, the Mediterranean campaign severely taxed the Luftwaffe. Luftwaffe aircraft were in short supply, particularly after such damaging losses on the Eastern Front. Having to provide support to the Mediterranean effort placed an unneeded drain on much needed airframes to fight the Russians. This was to prove to be a serious mistake on the part of the High Command at a time when the Russian offensive was underway.<sup>77</sup> By October 1942, "the Luftwaffe was a spent force. . . . It was [Hitler] who had committed Germany to North Africa, at a time when the forces available were insufficient to ensure a successful outcome. . . ."<sup>78</sup> By 1 January 1943, the bomber force was in bad condition with only 270 aircraft, of which 55 percent were serviceable.<sup>79</sup>

---

<sup>74</sup>Ibid., p. 196.

<sup>75</sup>Hermann, *The Luftwaffe: Its Rise and Fall*, pp. 265-266.

<sup>76</sup>Ibid., p. 266.

<sup>77</sup>Great Britain, Air Ministry, *The Rise and Fall of the German Air Force, 1933-1945*, pp. 145 and 159.

<sup>78</sup>Cooper, *The German Air Force, 1933-1945*, p. 212.

<sup>79</sup>Ibid., p. 216.

"The need to operate on three fronts taxed the Luftwaffe beyond its resources. The development and production crisis [by November 1941] . . . reflected the lack of foresight of Germany's military planners, who had gambled on the war by then being long since won."<sup>80</sup> By 1 January 1943, the total number of aircraft in the Luftwaffe's inventory was 4,000; all its reserves were gone; modern aircraft had still not been brought on line; and the hope for a war of short duration had all but faded away.<sup>81</sup> This was Hitler's fault, not the Luftwaffe's. It had been promised "short campaigns, one enemy at a time, and long breathing spells in between."<sup>82</sup> With the bomber as the Luftwaffe's front line combat aircraft, it is significant to note how production could not keep up with losses for all theaters:

**Luftwaffe Bomber Losses and Production, All Fronts - 1943**

<u>Month</u>	<u>Destroyed</u>	<u>Damaged</u>	<u>Production</u>
January	214	122	357
February	185	97	436
March	253	171	354
April	165	119	327
May	261	172	352
June	211	182	350
July	421	266	331
August	356	224	336
September	284	188	326
October	225	191	350
November	219	125	357
December	135	81	341

**Figure 2<sup>83</sup>**

The result: commitments all over Europe and Germany's three fronts increased as resources declined. Materiel resources were to catch up to commitments in the latter part of the war, but the loss of pilots was a resource not easily replaced.

---

<sup>80</sup>Bekker, *The Luftwaffe War Diaries*, p. 232.

<sup>81</sup>Great Britain, Air Ministry, *The Rise and Fall of the German Air Force, 1933-1945*. p. 202.

<sup>82</sup>Hermann, *The Luftwaffe: Its Rise and Fall*, p. 267.

<sup>83</sup>Muller, *The German Air War in Russia*, p. 188.

## Pilot Losses

On the eve of the war, "[i]n terms of training and morale, . . . the German crewmen were the equal of any, and superior to most, of their opponents."<sup>84</sup> Clearly training had been effective up to that time and during the initial months of Hitler's move across Europe. However, the attrition of aircraft also led to severe pilot losses, which had a damaging effect on attrition warfare (see figure 3). During the Battle of Britain, the Luftwaffe lost five air crew members to every one lost by the British. As a result, Goering permitted only one officer at a time in each aircraft.<sup>85</sup> As an example, during the first nine months of 1942, one Luftwaffe unit ". . . lost aircraft and crews [emphasis added] equal to its own strength once in each successive three month period. With the demands of the Russian front these losses were not all made good, and after starting 1942 with eighty-two crews the unit had only twenty-three left by September."<sup>86</sup> "The average number of fighter pilots available in combat squadrons over 1943 was 2105. The number of fighter pilots killed, wounded, or missing over the course of the year was 2967 or 141 percent. The inescapable conclusions that such statistics point to is that the Luftwaffe was in desperate trouble by the end of the year. . . ."<sup>87</sup> Severe loss of aircraft was a problem in and of itself; however, the Luftwaffe's offensive war fought over enemy territory, particularly over Russia, meant irreplaceable losses in trained aircrews.<sup>88</sup> Pilot attrition was not only the result of losses in combat, however; it was also the result of a lack of training.

The problems with training started early on. As each crisis developed in the German pre-war years of 1936 to 1939, training suffered. Training planes, as well as instructor pilots, were taken for operational needs. This ultimately led to a ten percent

---

<sup>84</sup>Price, *Luftwaffe: Birth, life and death of an air force*, p. 26.

<sup>85</sup>Cooper, *The German Air Force, 1933-1945*, p. 148.

<sup>86</sup>Price, *Luftwaffe: Birth, life and death of an air force*, p. 94.

<sup>87</sup>Murray, "Attrition and the Luftwaffe," p. 70.

<sup>88</sup>Price, *Luftwaffe: Birth, life and death of an air force*, p. 79.

shortage of qualified personnel in tactical units at the beginning of the war. Also, trainees were undisciplined, which led to an inordinately high accident rate (see figure 3).<sup>89</sup> Training deficiencies while conducting a strategic offensive could be attributed to the attitude of Colonel-General Hans Jeschonnek, Chief of the Luftwaffe General Staff. Believing the war would be short, he decreed that ". . . all resources, human and materiel, be devoted to insuring a quick decision."<sup>90</sup> This shortsightedness prevailed during the battle for Holland and the Battle of Britain, where training schools were cannibalized to support operational units.<sup>91</sup> Even with a plea from subordinates to increase training, Jeschonnek's response was, "Let's beat the Russians first, then we can start training."<sup>92</sup>

The Germans, however, were not to beat the Russians so easily, and abuse of the training mission continued. Because of the success of the first airlift operation in Russia and his refusal to allow his army to retreat, Hitler ordered his second airlift operation for the German Sixth Army, which was surrounded outside Stalingrad in December 1942. The Luftwaffe mustered all the planes it could and, because of the lack of airlifters and the supply needs of Sixth Army, employed bombers in airdrop operations. Three hundred fifty of the 850 airplanes used came from the advanced flying training schools. Losses totaled 488 aircraft, but the losses in experienced aircrews were not as easily replaced as airframes. The result was the complete shutdown of air crew training.<sup>93</sup> Training also suffered when all non-operational flying was curtailed to support other air drops, including standard operations that continued through the rainy season, normally a slow period in operations that allowed units to regenerate. "The resultant lowering of both the quality and the quantity of new

---

<sup>89</sup>McFarland and Newton, *To Command the Sky*, pp. 68-69.

<sup>90</sup>Ibid., p. 74.

<sup>91</sup>Bekker, *The Luftwaffe War Diaries*, p. 142, and McFarland and Newton, *To Command the Sky*, p. 74.

<sup>92</sup>McFarland and Newton, p. 75.

<sup>93</sup>Price, *Luftwaffe: Birth, life and death of an air force*, pp. 82-87.

aircrews, coming as it did after a time when losses had been high, was to cause great harm to the fighting ability of the Luftwaffe."<sup>94</sup> By now,

... it was ... clear that the Luftwaffe was ill-prepared for a long war. ... [T]he Germans had risked, and often accepted, high losses in order to achieve quick victory. And provided the victories came quickly, it did not matter so much if the advanced training organization had to be robbed of aircraft and instructors in order to reinforce the air transport force, if the war was going to be over before the new crews were really needed. The net result of all this was that at the beginning of 1943 the Luftwaffe faced a critical shortage of trained aircrews.<sup>95</sup>

#### German Aircrew Loss, 1939-1943

<i>Period</i>	<i>Killed and Missing</i>		<i>Wounded and Injured</i>		<i>Total</i>
	Operational Units	Training Units	Operational Units	Training Units	
Sep 1939- Jun 1941	11,584	1,951	3,559	2,439	19,533
Jun 1941- Dec 1943	<u>30,843</u>	<u>4,186</u>	<u>10,827</u>	<u>2,698</u>	<u>48,554</u>
<i>Grand Totals:</i>	42,427	6,137	14,386	5,137	68,087

Figure 3<sup>96</sup>

Despite the above, the Germans did not plan sufficiently for training needs in this war of attrition. At the outbreak of the war, the Luftwaffe's training plan produced between 10,000 and 15,000 pilots per year.<sup>97</sup> As mentioned earlier, Hitler reduced production quotas, because he believed the early victories would result in a short war. As the number of fronts expanded, more and more aircraft were destroyed or were diverted from training for operational needs. When Hitler ordered production stepped up in 1942, Goering tried to redirect aircraft back to training. He logically argued that

<sup>94</sup>Ibid., p. 87.

<sup>95</sup>Ibid., p. 95.

<sup>96</sup>Bekker, *The Luftwaffe War Diaries*, p. 380.

<sup>97</sup>Great Britain, Air Ministry, *The Rise and Fall of the German Air Force, 1933-1945*, p. 33.

the aircraft coming off the production line would be of no use without pilots. His warning, however, went unheeded, and by the latter part of 1942 training had virtually stopped.<sup>98</sup>

In 1943, the Air Ministry planned to produce 3,723 pilots, calling for a force expansion of 904 pilots. Not only did it fall short of its training needs by 79 pilots, but the Luftwaffe lost 3,413 during the same year. The training goals fell far short of what was required to fight a war of attrition. Aircraft production had begun to pick up by late 1943 to a monthly average of 937 single-engine fighters, but only 273 fighter pilots were graduating each month. As a result, the Luftwaffe fell short of planned needs by 592 pilots in 1943 alone, resulting in airplanes sitting on the ground.<sup>99</sup>

In addition, the quality of aircrews was poor in comparison to the Allied aircrews. The heavy pilot losses depicted in figure 3 meant heavy losses in experienced, as well as inexperienced, pilots. There was a continuous need for qualified instructors. Once again, long range planning was non-existent in meeting the increased demands.<sup>100</sup> This led to an overall deterioration in quality, but also demanded shorter training periods to put pilots in operational units. In 1943, a Luftwaffe pilot graduate received 160 hours in the air before being sent to an operational unit. RAF crews had 360 hours and U.S. Army Air Corps pilots had 400 hours of training in the air.<sup>101</sup> Another reason for the shortened training hours was due to a lack of fuel. The oil shortage first became apparent in late summer 1942 and intensified on the Eastern Front with airlift operations over Stalingrad. The continuous demands without the normal lull in operations taxed the oil reserve. Therefore, non-operational flying was again cut back, resulting in reduced training.<sup>102</sup>

---

<sup>98</sup>McFarland and Newton, *To Command the Sky*, p. 76.

<sup>99</sup>*Ibid.*, p. 122.

<sup>100</sup>Great Britain, Air Ministry, *The Rise and Fall of the German Air Force, 1933-1945*, pp. 315.

<sup>101</sup>McFarland and Newton, *To Command the Sky*, p. 77.

<sup>102</sup>Price, *Luftwaffe: Birth, life and death of an air force*, p. 87.

Consequently, Luftwaffe pilots had less flying experience, which resulted in more accidents and less quality airmanship than the Allies.

Another underlying issue that may not immediately come to mind is that Germany did not have an unlimited supply of manpower. Fighting a war on three fronts did not only occupy the Luftwaffe. The army was in desperate need of soldiers and most of the recruits were sent to one of the fronts. Also, people were needed in the factories to produce the aircraft and armaments that were coming off the production line even at the close of the war.

First-class fighter pilots are rare offspring [sic]. Germany's limited population could never hope to produce as many as her vaster opponent nations. The huge German losses made the gap in fighter pilot quality bigger and bigger as the war progressed. By the last year of the war many of the German single-engine fighter pilots were hardly fit to do much more than take off and land the aircraft they flew. It was the German pilot deficiencies much more than the aircraft technical deficiencies which gave the Allies such complete air domination towards the end of the war.<sup>103</sup>

So, to answer the question why, if the factories were producing planes in sufficient numbers, did the Allies find German aircraft sitting on the ground after the war can be found, in part, in the fact there were no qualified pilots to fly them. "In fact, the inadequacy of the supply of fully trained experienced pilots and crews was an . . . important factor in the operational decline of the Luftwaffe. The German Air Force staff failed to anticipate their training requirements in time, and the final eclipse of the Luftwaffe in the second world war was due in no small measure to this lack of foresight."<sup>104</sup>

---

<sup>103</sup>Lee, *The German Air Force*, pp. 283-284.

<sup>104</sup>*Ibid.*, p. 44.

## CHAPTER IV

### SUMMARY

To summarize, the American entry into the air war in January 1943 with the strategic bombing campaign and the subsequent arrival of the long-range fighter in December 1943 started a new campaign the Luftwaffe would never be able to stand up to. By mid-1943, when the Allied air forces started *Operation Pointblank*, Germany by all rights had already lost the air war. The Luftwaffe was unprepared for a war of long duration, because Germany's senior leadership did not believe the war could last under the power of the *Blitzkrieg*. Decisions to stop or curtail airplane production and the lack of development effort for new and more technologically advanced aircraft capable of offering a new strategy for the Luftwaffe were not only based on this faulty belief but, in turn, were the foundations that led to attrition of aircraft while simultaneously conducting a three-front war. In addition, pilot attrition, as a result of normal losses and the lack of training, is critical to understanding why there were so many planes left on the ground at the end of the war. Yes, we owe a debt of gratitude to American and British pilots from the summer of 1943 to 1944. They did win air superiority over the battlefield, which cleared the way for the invasion of Normandy, but their involvement was only one part of a war of attrition the Luftwaffe had been fighting and subsequently lost.

## CHAPTER V

### CONCLUSION

In conclusion, I have not tried to lay out a picture of defeat for Germany during the Second World War. I do not presume the above to be the only reasons for the downfall of the Luftwaffe. However, I believe it provides a basic foundation for answering the puzzling question of why, when so many airplanes were found sitting on the ground at the end of the war, the Allies won air superiority over Germany. The answer lies in the early mindset of Germany's leadership, the subsequent decision to halt production of aircraft, the decisions to produce inadequate types of aircraft needed to prosecute the war in the last years, and the high attrition rates, while fighting a three-front war, of both aircraft and pilots, which, in turn, affected pilot training. By the time production was up-to-speed, they were the wrong type of airplanes with no one to fly them. Yes, it was a war of attrition. How the Luftwaffe stood up to such overpowering odds in the last two years of the war, when it had basically been lost by that time, is testament to the will of the airman one has to respect. Throughout my research, I found a deep respect by all authors for the professionalism and gallantry of the airmen of the Luftwaffe. One cannot attribute its defeat in the air to those airmen. The foundations of defeat and the attrition that led to its defeat in the air can only be attributed to the leadership and the decisions they made at crucial points before and during the war.

## BIBLIOGRAPHY

- Bartz, Karl. *Swastika in the Air*. London: William Kimber and Co. Limited, 1956.
- Baumbach, Werner. *Broken Swastika: The Defeat of the Luftwaffe*. Translated by Frederick Holt. London: Robert Hale Limited, 1960.
- Baumbach, Werner. *The Life and Death of the Luftwaffe*. Translated by Frederick Holt. New York: Ballantine Books, 1949.
- Bekker, Cajus. *The Luftwaffe War Diaries*. Translated and edited by Frank Ziegler. London: MacDonald & Co. Ltd., 1966.
- Cooper, Matthew. *The German Air Force, 1933-1945: An Anatomy of Failure*. New York, Jane's Publishing Incorporated, 1981.
- Galland, Adolf, Generalleutnant (Ret.), "Defeat of the Luftwaffe: Fundamental Causes." *Air University Quarterly Review*, Spring 1953, No. 6, pages 16-36.
- Galland, Adolf. *The First and the Last: The Rise and Fall of the German Fighter Forces, 1938-1949*. Translated by Mervyn Savill. New York: Holt, 1954.
- Great Britain, Air Ministry. *The Rise and Fall of the German Air Force, 1933-1945*. Great Britain: Arms and Armour Press Ltd., 1983.
- Hermann, Hauptmann. *The Luftwaffe: Its Rise and Fall*. New York: G. P. Putnam's Sons, 1943.
- Homze, Edward L. *Arming the Luftwaffe*. Lincoln: University of Nebraska Press, 1976.
- Lee, Asher. *The German Air Force*. New York: Harper & Brothers Publishers, 1946.
- McFarland, Stephen L., and Newton, Wesley Phillips. *To Command the Sky*. Washington: Smithsonian Institution Press, 1991.
- Muller, Richard. *The German Air War in Russia*. Baltimore, Maryland: The Nautical & Aviation Publishing Company of America, 1992.
- Murray, Williamson, "Attrition and the Luftwaffe." *Air University Review*, March-April 1983, Vol. XXXIV, No. 3, pages 66-77.
- Murray, Williamson. *German Military Effectiveness*. Baltimore, Maryland: The Nautical & Aviation Publishing Company of America, 1992.

Murray, Williamson. *Strategy for Defeat, the Luftwaffe, 1933-1945*. Maxwell Air Force Base, AL: Air University Press, 1983.

Overy, R. J. *The Air War, 1939-1945*. New York: Stein and Day Publishers, 1981.

Price, Alfred. *Luftwaffe: Birth, life and death of an air force*. New York, NY: Ballantine Books Inc., 1969.

United States Strategic Bombing Surveys. Report No. 1. *Summary Report (European War)*, September 30, 1945. Reprinted by Air University Press, Maxwell Air Force Base, Alabama, October 1987.

Willmott, H. P. *The Great Crusade*. New York: The Free Press, A Division of Macmillan, Inc., 1989.